

**SEQUENCE LISTING****1 GENERAL INFORMATION**

i) APPLICANT: Scandinavian Biotechnology Research AB

ii) TITLE OF INVENTION: Use of a class of enzymes and their encoding genes to increase oil content in transgenic organisms

iii) Number of sequences: 2

**2) INFORMATION FOR SEQ ID NO:1:**

i) SEQUENCE CHARACTERISTICS:

A) LENGTH: 1833 bases

B) TYPE: nucleic acid

C) STRANDEDNESS: single

D) TOPOLOGY: linear

ii) MOLECULE TYPE: DNA

iii) SEQUENCE DESCRIPTION:: SEQ ID NO: 1:

|  |     |
|--|-----|
| ATGACGGAGA CTAAGGATTT GTTGCAAGAC GAAGAGTTTC TTAAGATCCG | 50  |
| CAGACTCAAT TCCGCAGAAG CCAACAACG GCATTCGGTC ACGTACGATA  | 100 |
| ACGTGATCCT GCCACAGGAG TCCATGGAGG TTTCGCCACG GTCGTCTACC | 150 |
| ACGTCGCTGG TGGAGCCAGT GGAGTCGACT GAAGGAGTGG AGTCGACTGA | 200 |
| GGCGGAACGT GTGGCAGGGA AGCAGGAGCA GGAGGAGGAG TACCCTGTGG | 250 |

SEQUENCE LISTING

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|             |             |            |            |            |      |
|-------------|-------------|------------|------------|------------|------|
| ACGCCCACAT  | GCAAAAGTAC  | CTTTCACACC | TGAAGAGCAA | GTCTCGGTCG | 300  |
| AGGTTCACACC | GAAAGGATGC  | TAGCAAGTAT | GTGTCGTTTT | TTGGGGACGT | 350  |
| GAGTTTTGAT  | CCTCGCCCCA  | CGCTCCTGGA | CAGCGCCATC | AACGTGCCCT | 400  |
| TCCAGACGAC  | TTTCAAAGGT  | CCGGTGCTGG | AGAAACAGCT | CAAAAATTTA | 450  |
| CAGTTGACAA  | AGACCAAGAC  | CAAGGCCACG | GTGAAGACTA | CGGTGAAGAC | 500  |
| TACGGAGAAA  | ACGGACAAGG  | CAGATGCCCC | CCCAGGAGAA | AAACTGGAGT | 550  |
| CGAACTTTTC  | AGGGATCTAC  | GTGTTGCGAT | GGATGTTCTT | GGGCTGGATA | 600  |
| GCCATCAGGT  | GCTGCACAGA  | TTACTATGCG | TCGTACGGCA | GTGCATGGAA | 650  |
| TAAGCTGGAA  | ATCGTGCAGT  | ACATGACAAC | GGACTTGTTT | ACGATCGCAA | 700  |
| TGTTGGACTT  | GGCAATGTTC  | CTGTGCACTT | TCTTCGTGGT | TTTCGTGCAC | 750  |
| TGGCTGGTGA  | AAAAGCGGAT  | CATCAACTGG | AAGTGGACTG | GGTTCGTTGC | 800  |
| AGTGAGCATC  | TTGAGTTGG   | CTTTCATCCC | CGTGACGTTT | CCCATTTACG | 850  |
| TCTACTACTT  | TGATTTCAAC  | TGGGTCACGA | GAATCTTCCT | GTCCTGCAC  | 900  |
| TCCGTGGTGT  | TTGTTATGAA  | GAGCCACTCG | TTTGCCTTTT | ACAACGGGTA | 950  |
| TCTTTGGGAC  | ATAAAGCAGG  | AACTCGAGTA | CTCTTCCAAA | CAGTTGCAAA | 1000 |
| AATACAAGGA  | ATCTTTGTCC  | CCAGAGACCC | GCGAGATTCT | GCAAAAAGT  | 1050 |
| TGCGACTTTT  | GCCTTTTTCGA | ATTGAACTAC | CAGACCAAGG | ATAACGACTT | 1100 |

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|  |      |
|--|------|
| CCCCAACAAAC ATCAGTTGCA GCAATTTCCTT CATGTTCTGT TTGTTCCCCG | 1150 |
| TCCTCGTGTA CCAGATCAAC TACCCAAGAA CGTCGCGCAT CAGATGGAGG   | 1200 |
| TATGTGTTGG AGAAGGTGTG CGCCATCATT GGCACCATCT TCCTCATGAT   | 1250 |
| GGTCACGGCA CAGTTCTTCA TGCACCCGGT GGCCATGCGC TGTATCCAGT   | 1300 |
| TCCACAACAC GCCCACCTTC GGCGGCTGGA TCCCCGCCAC GCAAGAGTGG   | 1350 |
| TTCCACCTGC TCTTCGACAT GATTCCGGGC TTCACTGTTC TGTACATGCT   | 1400 |
| CACGTTTTTAC ATGATATGGG ACGCTTTATT GAATTGCGTG GCGGAGTTGA  | 1450 |
| CCAGGTTTGC GGACAGATAT TTCTACGGCG ACTGGTGGAA TTGCGTTTCG   | 1500 |
| TTTGAAGAGT TTAGCAGAAT CTGGAACGTC CCCGTTCACT AATTTTTACT   | 1550 |
| AAGACACGTG TACCACAGCT CCATGGGCGC ATTGCATTG AGCAAGAGCC    | 1600 |
| AAGCTACATT ATTTACTTTT TTCTTGAGTG CCGTGTTCCA CGAAATGGCC   | 1650 |
| ATGTTCGCCA TTTTCAGAAG GGTAGAGGA TATCTGTTCA TGTTCCAAC     | 1700 |
| GTCGCAGTTT GTGTGGACTG CTTTGAGCAA CACCAAGTTT CTACGGGCAA   | 1750 |
| GACCGCAGTT GTCCAACGTT GTCTTTTCGT TTGGTGTCTG TTCAGGGCCC   | 1800 |
| AGTATCATTA TGACGTTGTA CCTGACCTTA TGA                     | 1833 |

2) INFORMATION FOR SEQ ID NO:2:

### i) SEQUENCE CHARACTERISTICS:

- A) LENGTH: 610 amino acids  
B) TYPE: amino acid  
D) TOPOLOGY: linear

## ii) MOLECULE TYPE: protein

iii) SEQUENCE DESCRIPTION: SEQ ID NO: 2:

|            |            |            |            |           |            |            |            |            |            |            |            |            |            |            |            |
|------------|------------|------------|------------|-----------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Met<br>1   | Thr        | Glu        | Thr        | Lys<br>5  | Asp        | Leu        | Leu        | Gln        | Asp<br>10  | Glu        | Glu        | Phe        | Leu        | Lys<br>15  | Ile        |
| Arg        | Arg        | Leu        | Asn<br>20  | Ser       | Ala        | Glu        | Ala        | Asn<br>25  | Lys        | Arg        | His        | Ser        | Val<br>30  | Thr        | Tyr        |
| Asp        | Asn<br>35  | Val        | Ile        | Leu       | Pro        | Gln        | Glu<br>40  | Ser        | Met        | Glu        | Val        | Ser<br>45  | Pro        | Arg        | Ser        |
| Ser        | Thr<br>50  | Thr        | Ser        | Leu       | Val        | Glu<br>55  | Pro        | Val        | Glu        | Ser        | Thr<br>60  | Glu        | Gly        | Val        | Glu        |
| Ser<br>65  | Thr        | Glu        | Ala        | Glu       | Arg<br>70  | Val        | Ala        | Gly        | Lys        | Gln<br>75  | Glu        | Gln        | Glu        | Glu        | Glu<br>80  |
| Tyr        | Pro        | Val        | Asp        | Ala<br>85 | His        | Met        | Gln        | Lys        | Tyr<br>90  | Leu        | Ser        | His        | Leu        | Lys<br>95  | Ser        |
| Lys        | Ser        | Arg        | Ser<br>100 | Arg       | Phe        | His        | Arg        | Lys<br>105 | Asp        | Ala        | Ser        | Lys        | Tyr<br>110 | Val        | Ser        |
| Phe        | Phe        | Gly<br>115 | Asp        | Val       | Ser        | Phe        | Asp<br>120 | Pro        | Arg        | Pro        | Thr        | Leu<br>125 | Leu        | Asp        | Ser        |
| Ala<br>130 | Ile        | Asn        | Val        | Pro       | Phe        | Gln<br>135 | Thr        | Thr        | Phe        | Lys        | Gly<br>140 | Pro        | Val        | Leu        | Glu        |
| Lys<br>145 | Gln        | Leu        | Lys        | Asn       | Leu<br>150 | Gln        | Leu        | Thr        | Lys        | Thr<br>155 | Lys        | Thr        | Lys        | Ala        | Thr<br>160 |
| Val        | Lys        | Thr        | Thr<br>165 | Val       | Lys        | Thr        | Thr        | Glu        | Lys<br>170 | Thr        | Asp        | Lys        | Ala        | Asp<br>175 | Ala        |
| Pro        | Pro        | Gly        | Glu<br>180 | Lys       | Leu        | Glu        | Ser        | Asn<br>185 | Phe        | Ser        | Gly        | Ile        | Tyr<br>190 | Val        | Phe        |
| Ala        | Trp<br>195 | Met        | Phe        | Leu       | Gly        | Trp        | Ile<br>200 | Ala        | Ile        | Arg        | Cys        | Cys<br>205 | Thr        | Asp        | Tyr        |

1. *Chlorophyll a* (Chl *a*)  
 2. *Chlorophyll b* (Chl *b*)  
 3. *Chlorophyll c* (Chl *c*)  
 4. *Chlorophyll d* (Chl *d*)  
 5. *Chlorophyll e* (Chl *e*)  
 6. *Chlorophyll f* (Chl *f*)  
 7. *Chlorophyll g* (Chl *g*)  
 8. *Chlorophyll h* (Chl *h*)  
 9. *Chlorophyll i* (Chl *i*)  
 10. *Chlorophyll j* (Chl *j*)  
 11. *Chlorophyll k* (Chl *k*)  
 12. *Chlorophyll l* (Chl *l*)  
 13. *Chlorophyll m* (Chl *m*)  
 14. *Chlorophyll n* (Chl *n*)  
 15. *Chlorophyll o* (Chl *o*)  
 16. *Chlorophyll p* (Chl *p*)  
 17. *Chlorophyll q* (Chl *q*)  
 18. *Chlorophyll r* (Chl *r*)  
 19. *Chlorophyll s* (Chl *s*)  
 20. *Chlorophyll t* (Chl *t*)  
 21. *Chlorophyll u* (Chl *u*)  
 22. *Chlorophyll v* (Chl *v*)  
 23. *Chlorophyll w* (Chl *w*)  
 24. *Chlorophyll x* (Chl *x*)  
 25. *Chlorophyll y* (Chl *y*)  
 26. *Chlorophyll z* (Chl *z*)  
 27. *Chlorophyll aa* (Chl *aa*)  
 28. *Chlorophyll ab* (Chl *ab*)  
 29. *Chlorophyll ac* (Chl *ac*)  
 30. *Chlorophyll ad* (Chl *ad*)  
 31. *Chlorophyll ae* (Chl *ae*)  
 32. *Chlorophyll af* (Chl *af*)  
 33. *Chlorophyll ag* (Chl *ag*)  
 34. *Chlorophyll ah* (Chl *ah*)  
 35. *Chlorophyll ai* (Chl *ai*)  
 36. *Chlorophyll aj* (Chl *aj*)  
 37. *Chlorophyll ak* (Chl *ak*)  
 38. *Chlorophyll al* (Chl *al*)  
 39. *Chlorophyll am* (Chl *am*)  
 40. *Chlorophyll an* (Chl *an*)  
 41. *Chlorophyll ao* (Chl *ao*)  
 42. *Chlorophyll ap* (Chl *ap*)  
 43. *Chlorophyll aq* (Chl *aq*)  
 44. *Chlorophyll ar* (Chl *ar*)  
 45. *Chlorophyll as* (Chl *as*)  
 46. *Chlorophyll at* (Chl *at*)  
 47. *Chlorophyll au* (Chl *au*)  
 48. *Chlorophyll av* (Chl *av*)  
 49. *Chlorophyll aw* (Chl *aw*)  
 50. *Chlorophyll ax* (Chl *ax*)  
 51. *Chlorophyll ay* (Chl *ay*)  
 52. *Chlorophyll az* (Chl *az*)  
 53. *Chlorophyll ba* (Chl *ba*)  
 54. *Chlorophyll bb* (Chl *bb*)  
 55. *Chlorophyll bc* (Chl *bc*)  
 56. *Chlorophyll bd* (Chl *bd*)  
 57. *Chlorophyll be* (Chl *be*)  
 58. *Chlorophyll bf* (Chl *bf*)  
 59. *Chlorophyll bg* (Chl *bg*)  
 60. *Chlorophyll bh* (Chl *bh*)  
 61. *Chlorophyll bi* (Chl *bi*)  
 62. *Chlorophyll bj* (Chl *bj*)  
 63. *Chlorophyll bk* (Chl *bk*)  
 64. *Chlorophyll bl* (Chl *bl*)  
 65. *Chlorophyll bm* (Chl *bm*)  
 66. *Chlorophyll bn* (Chl *bn*)  
 67. *Chlorophyll bo* (Chl *bo*)  
 68. *Chlorophyll bp* (Chl *bp*)  
 69. *Chlorophyll bq* (Chl *bq*)  
 70. *Chlorophyll br* (Chl *br*)  
 71. *Chlorophyll bs* (Chl *bs*)  
 72. *Chlorophyll bt* (Chl *bt*)  
 73. *Chlorophyll bu* (Chl *bu*)  
 74. *Chlorophyll bv* (Chl *bv*)  
 75. *Chlorophyll bw* (Chl *bw*)  
 76. *Chlorophyll bx* (Chl *bx*)  
 77. *Chlorophyll by* (Chl *by*)  
 78. *Chlorophyll bz* (Chl *bz*)  
 79. *Chlorophyll ca* (Chl *ca*)  
 80. *Chlorophyll cb* (Chl *cb*)  
 81. *Chlorophyll cc* (Chl *cc*)  
 82. *Chlorophyll cd* (Chl *cd*)  
 83. *Chlorophyll ce* (Chl *ce*)  
 84. *Chlorophyll cf* (Chl *cf*)  
 85. *Chlorophyll cg* (Chl *cg*)  
 86. *Chlorophyll ch* (Chl *ch*)  
 87. *Chlorophyll ci* (Chl *ci*)  
 88. *Chlorophyll cj* (Chl *cj*)  
 89. *Chlorophyll ck* (Chl *ck*)  
 90. *Chlorophyll cl* (Chl *cl*)  
 91. *Chlorophyll cm* (Chl *cm*)  
 92. *Chlorophyll cn* (Chl *cn*)  
 93. *Chlorophyll co* (Chl *co*)  
 94. *Chlorophyll cp* (Chl *cp*)  
 95. *Chlorophyll cq* (Chl *cq*)  
 96. *Chlorophyll cr* (Chl *cr*)  
 97. *Chlorophyll cs* (Chl *cs*)  
 98. *Chlorophyll ct* (Chl *ct*)  
 99. *Chlorophyll cu* (Chl *cu*)  
 100. *Chlorophyll cv* (Chl *cv*)  
 101. *Chlorophyll cw* (Chl *cw*)  
 102. *Chlorophyll cx* (Chl *cx*)  
 103. *Chlorophyll cy* (Chl *cy*)  
 104. *Chlorophyll cz* (Chl *cz*)  
 105. *Chlorophyll da* (Chl *da*)  
 106. *Chlorophyll db* (Chl *db*)  
 107. *Chlorophyll dc* (Chl *dc*)  
 108. *Chlorophyll dd* (Chl *dd*)  
 109. *Chlorophyll de* (Chl *de*)  
 110. *Chlorophyll df* (Chl *df*)  
 111. *Chlorophyll dg* (Chl *dg*)  
 112. *Chlorophyll dh* (Chl *dh*)  
 113. *Chlorophyll di* (Chl *di*)  
 114. *Chlorophyll dj* (Chl *dj*)  
 115. *Chlorophyll dk* (Chl *dk*)  
 116. *Chlorophyll dl* (Chl *dl*)  
 117. *Chlorophyll dm* (Chl *dm*)  
 118. *Chlorophyll dn* (Chl *dn*)  
 119. *Chlorophyll do* (Chl *do*)  
 120. *Chlorophyll dp* (Chl *dp*)  
 121. *Chlorophyll dq* (Chl *dq*)  
 122. *Chlorophyll dr* (Chl *dr*)  
 123. *Chlorophyll ds* (Chl *ds*)  
 124. *Chlorophyll dt* (Chl *dt*)  
 125. *Chlorophyll du* (Chl *du*)  
 126. *Chlorophyll dv* (Chl *dv*)  
 127. *Chlorophyll dw* (Chl *dw*)  
 128. *Chlorophyll dx* (Chl *dx*)  
 129. *Chlorophyll dy* (Chl *dy*)  
 130. *Chlorophyll dz* (Chl *dz*)  
 131. *Chlorophyll ea* (Chl *ea*)  
 132. *Chlorophyll eb* (Chl *eb*)  
 133. *Chlorophyll ec* (Chl *ec*)  
 134. *Chlorophyll ed* (Chl *ed*)  
 135. *Chlorophyll ee* (Chl *ee*)  
 136. *Chlorophyll ef* (Chl *ef*)  
 1

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|            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |
|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Tyr<br>210 | Ala        | Ser        | Tyr        | Gly        | Ser        | Ala        | Trp        | Asn        | Lys        | Leu        | Glu        | Ile        | Val        | Gln        | Tyr        |
| Met<br>225 | Thr        | Thr        | Asp        | Leu        | Phe<br>230 | Thr        | Ile        | Ala        | Met        | Leu<br>235 | Asp        | Leu        | Ala        | Met        | Phe<br>240 |
| Leu        | Cys        | Thr        | Phe        | Phe<br>245 | Val        | Val        | Phe        | Val        | His<br>250 | Trp        | Leu        | Val        | Lys        | Lys<br>255 | Arg        |
| Ile        | Ile        | Asn        | Trp<br>260 | Lys        | Trp        | Thr        | Gly        | Phe<br>265 | Val        | Ala        | Val        | Ser        | Ile<br>270 | Phe        | Glu        |
| Leu        | Ala        | Phe        | Ile        | Pro        | Val        | Thr        | Phe<br>280 | Pro        | Ile        | Tyr        | Val        | Tyr<br>285 | Tyr        | Phe        | Asp        |
| Phe        | Asn<br>290 | Trp        | Val        | Thr        | Arg        | Ile<br>295 | Phe        | Leu        | Phe        | Leu        | His<br>300 | Ser        | Val        | Val        | Phe        |
| Val<br>305 | Met        | Lys        | Ser        | His        | Ser<br>310 | Phe        | Ala        | Phe        | Tyr        | Asn<br>315 | Gly        | Tyr        | Leu        | Trp        | Asp<br>320 |
| Ile        | Lys        | Gln        | Glu        | Leu<br>325 | Glu        | Tyr        | Ser        | Ser        | Lys<br>330 | Gln        | Leu        | Gln        | Lys        | Tyr<br>335 | Lys        |
| Glu        | Ser        | Leu        | Ser<br>340 | Pro        | Glu        | Thr        | Arg        | Glu<br>345 | Ile        | Leu        | Gln        | Lys        | Ser<br>350 | Cys        | Asp        |
| Phe        | Cys        | Leu        | Phe        | Glu        | Leu        | Asn        | Tyr<br>360 | Gln        | Thr        | Lys        | Asp        | Asn<br>365 | Asp        | Phe        | Pro        |
| Asn<br>370 | Asn        | Ile        | Ser        | Cys        | Ser        | Asn<br>375 | Phe        | Phe        | Met        | Phe        | Cys<br>380 | Leu        | Phe        | Pro        | Val        |
| Leu<br>385 | Val        | Tyr        | Gln        | Ile        | Asn<br>390 | Tyr        | Pro        | Arg        | Thr        | Ser<br>395 | Arg        | Ile        | Arg        | Trp        | Arg<br>400 |
| Tyr        | Val        | Leu        | Glu        | Lys<br>405 | Val        | Cys        | Ala        | Ile        | Ile<br>410 | Gly        | Thr        | Ile        | Phe        | Leu<br>415 | Met        |
| Met        | Val        | Thr        | Ala<br>420 | Gln        | Phe        | Phe        | Met        | His<br>425 | Pro        | Val        | Ala        | Met        | Arg<br>430 | Cys        | Ile        |
| Gln        | Phe        | His<br>435 | Asn        | Thr        | Pro        | Thr        | Phe<br>440 | Gly        | Gly        | Trp        | Ile        | Pro<br>445 | Ala        | Thr        | Gln        |
| Glu<br>450 | Trp        | Phe        | His        | Leu        | Leu        | Phe<br>455 | Asp        | Met        | Ile        | Pro        | Gly<br>460 | Phe        | Thr        | Val        | Leu        |
| Tyr<br>465 | Met        | Leu        | Thr        | Phe        | Tyr<br>470 | Met        | Ile        | Trp        | Asp        | Ala<br>475 | Leu        | Leu        | Asn        | Cys        | Val<br>480 |
| Ala        | Glu        | Leu        | Thr<br>485 | Arg        | Phe        | Ala        | Asp        | Arg        | Tyr<br>490 | Phe        | Tyr        | Gly        | Asp        | Trp<br>495 | Trp        |
| Asn        | Cys        | Val        | Ser<br>500 | Phe        | Glu        | Glu        | Phe        | Ser<br>505 | Arg        | Ile        | Trp        | Asn        | Val<br>510 | Pro        | Val        |
| His<br>515 | Lys        | Phe        | Leu        | Leu        | Arg        | His        | Val<br>520 | Tyr        | His        | Ser        | Ser        | Met<br>525 | Gly        | Ala        | Leu        |

**Abstract**

